MANITOBA CLEAN ENVIRONMENT COMMISSION

REPORT ON THE INVESTIGATION OF SMOKE PROBLEMS ENCOUNTERED IN SOUTHERN MANITOBA IN 1976

Winnipeg, July 1977.

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Province of Manitoba
Clean Environment Commission
Office of the Chairman

Box 4, 139 Tuxedo Avenue
Winnipeg, Manitoba
R3N 0H6

July 20, 1977

The Honourable Sidney Green, Q.C.,
Minister,
Department of Mines, Resources and
Environmental Management,
Room 302 Legislative Building,
405 Broadway Avenue,
WINNIPEG, Manitoba.
R3C 0V8

Dear Mr. Green:

Re: Report on the Investigation of Smoke Problems Encountered in Southern Manitoba in 1976

In my letter of 77 02 18, which contained recommendations on matters that required immediate attention, it was indicated that a complete report and recommendations would be forwarded to you, arising from the evidence and representations received during the course of eight separate hearings on the subject of smoke problems encountered in southern Manitoba during the year 1976.

The report and recommendations are herewith respectfully submitted.

On behalf of the Commission,

Guy E. Moore,
Chairman.

Gift: Commission

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Chapter 1

PREFACE

The Hon. Sidney Green, Q.C., Minister of the Department of Mines, Resources and Environmental Management, instructed the Clean Environment Commission by letter of November 8, 1976, to investigate the problems relating to the unusual presence of smoke in Southern Manitoba. Investigations by his Department had revealed that the problems were related to peat moss and brush fires as well as the traditional stubble burning practice by agricultural producers. Specifically, the Minister requested the Commission to define the source of the problem and to relate it to Section 1(d) of the Clean Environment Act. The Minister asked the Commission to determine whether legislative controls are recommended and, if deemed desirable, what form such controls should take. Finally, the Minister instructed the Commission to ensure that public hearings provide all interested parties an opportunity to present their comments. A copy of the letter is attached to this report as Appendix A.

In response to this request the Clean Environment Commission held 7 regional public hearings in locations close to the affected areas, namely,

Lac du Bonnet, on December 7, 1976,

Falcon Lake, on December 8, 1976,

Steinbach, on December 9, 1976,

Brandon, on December 17, 1976,

Carman, on January 4, 1977,

Teulon, on January 5, 1977,

Dauphin, on January 12, 1977.

In addition, a central hearing was held in Winnipeg on January 17, 18 and 31 and on February 1, 1977. Ninety written submissions were received during the course of the hearings in addition to many verbal presentations. Verbatim records of all hearings were made and are available at the Commission's office. A list of all exhibits and a copy of the advertisement for the hearings is included as Appendix B of this report.

Evidence received during the hearings indicated that, due to uncertain jurisdiction, several serious fires were still burning unattended in some of the peat moss areas of the province. This situation demanded immediate action especially in view of the low moisture conditions prevailing at that time. The Commission, therefore, decided to bring this matter forthwith to the attention of the Minister, without waiting for the preparation of the final report. A letter with interim recommendations was sent to the Minister on February 18, 1977.

The government responded promptly with (a) initiating action to suppress all existing peat moss fires; (b) enlarging the "Wooded District", in which fire control responsibilities are well defined and fire fighting capability present, to include all major peat moss areas in the province; and (c) extending the closed season for fires in the Wooded District for 1977 over the entire year. The timely action by the government did much to alleviate the dangerous fire situation which existed in the early months of 1977.

The Commission respectfully submits herewith the final report of its findings and wishes to express its indebtedness to the many agencies and private persons who took the time

and trouble to appear at the hearings and to enlighten the Commission about the many aspects of this complex problem through many valuable contributions.

Chapter 2

INTRODUCTION

Wildfire is a common experience, especially in the eastern part of southern Manitoba. Each year hundreds of accidental brush and forest fires are started by negligence or by lightning. In addition, fire has been used since the area was first settled for agricultural purposes, to clear land of brush and undesired peat moss deposits. As in other parts of the province, many farmers dispose occasionally of excess straw and other crop residue by setting it on fire. Then there are fires set to clean road allowances and highway ditches, fires to burn off weeds or tall grass and fires to dispose of waste. It is to be expected, therefore, that the natural and man-made fires will at times create smoke problems, which may vary from minor to severe.

In the second half of 1976 the smoke problem was exceptionally severe. At times dense smoke blanketed highways and caused serious traffic accidents in which three people were killed and 61 injured. At other times the smoke formed a haze that covered major parts of the province. In addition, there was property damage, damage to forests and damage to agricultural land. A description of these problems is given in Chapter 3 of this report.

The Commission found that the smoke was primarily caused by burning peat moss deposits. Some peat fires had started accidentally as the result of the overlying brush or grass catching fire. Many peat fires, however, had been set deliberately for the purpose of removing the peat from the land and

making it suitable for cereal crops. A layer of peat moss in situ will burn only to the depth it has been dried out. Farmers must therefore wait for dry years to be able to rid their land of peat by burning it off, which is the cheapest way of disposal. Even then, the peat retains large amounts of moisture, which is the cause of the dense smoke that accompanies peat fires. The efforts of many farmers in 1976 to get rid of as much peat as possible thus combined with the many accidental peat fires to create an unusually severe smoke problem.

The Commission was thus confronted with the problem that what in the peat moss areas traditionally has been regarded as a necessary and legitimate agricultural practice, causes grave hazards to others, as was evidenced by the injuries and deaths on the highways caused by smoke. Since dense smoke is an unavoidable consequence of burning peat, the question must be faced whether the benefits to the farmers warrant the risk others are exposed to.

All types of open burning entail potential hazards to a greater or lesser degree and the Commission therefore investigated not only the need for the disposal of peat by fire but also the burning of agricultural residue, burning for wildlife mangement, land clearing, waste disposal, weed control and general cleaning purposes. In each case the need for burning was critically examined as well as the precautions needed to reduce hazards.

The second major problem the Commission encountered was brought to light by the fact that, even at the time of the hearings, several wildfires burned out of control without anyone doing anything abouth them. One of these was the large peat fire

near Richer, Manitoba, which had already claimed two lives in a smoke-caused highway accident. The Commission found to its surprise that outside the so-called Wooded District no one is required to take action in case of wildfire. In a general sense, fire control is a municipal responsibility; however, the legislation dealing with it is permissive and does not oblige a municipality or any other agency to do anything about a fire. Sometimes no one will.

By contrast, the situation within the Wooded District is well under control; there is no uncertainty at all about who is authorized and obliged to take action in case of fire, nor is there any uncertainty about the responsibility for fire prevention and detection.

A considerable part of the investigation dealt with the problem of responsibility for wildfire control outside the Wooded District and what legislative and administrative changes would be needed to ensure responsible action when necessary.

An associated problem is the necessary upgrading of the municipal capability to cope with any wildfire they may have to deal with.

In the report which follows the 1976 smoke problem is first described in some detail in Chapter 3. The next chapter deals with the existent wildfire control system in the province and discusses the problems the severe fire season brought to light. Chapter 5 relates the smoke problem to the Clean Environment Act and investigates whether smoke could be dealt with

adequately by regarding it as a contaminant under the Act. Chapter 6 discusses the pros and cons of the current practice of open burning to achieve a variety of purposes. Chapter 7, in recognition of the fact that not all fires can be prevented, discusses the prevention of traffic accidents when smoke covers highways. Chapter 8 is devoted to a discussion of the need for administrative and legislative change. Chapter 9, finally, lists specific recommendations formulated by the Commission as a result of the investigation.

Chapter 3

THE 1976 SMOKE PROBLEM

Unusual amounts of smoke pervaded southern Manitoba throughout the summer and fall of 1976. The smoke frequently blanketed highways, totally obliterating visibility and causing traffic accidents. Dense smoke also engulfed residences for prolonged periods and spread as a haze over major parts of the province, causing concern for public health.

Cause of the problem was the unprecedented drought that prevailed in the eastern prairies and northwestern Ontario. In the late summer and fall of that year most of the area received less than 25 percent of the long term average precipitation. Consequently, Manitoba experienced the most severe forest fire season in recorded history. While in an average year there may be some 400 fires on approximately 100,000 acres of land, in 1976 there were 1128 forest fires in the Wooded District which burned 160,000 acres of productive, or potentially productive, forest land. About 700 of these were man-made. In addition, fire departments responded to an estimated 3000 wildfires outside the Wooded District.

The extreme drought had also lowered the groundwater table in the extensive peat deposits, which underlie many forests in the province. This allowed the peat to dry out to some depth and in many cases the brush fires ignited it. At one time there were more than 200 peat fires burnimg on more than 70,000 acres of land.

Peat fires are difficult to control and, when out of control,

almost impossible to put out. They keep on smouldering, continually emitting vast quantities of thick smoke, until extinguished by rain and a rising groundwater table. Peat fires were therefore by far the most important cause of the problem under investigation.

Not all peat fires had started accidentally. In southeastern Manitoba farmers have burned off peat for many decades in order to make the land more suitable for cereal crops and this process is still going on. The cheapest way of getting rid of peat is to burn it in situ. This can be done only on dry years in which the top layer has dried out sufficiently to be ignited. It may take a farmer ten or more years to dispose of a thick peat layer; he will thus be inclined to take advantage of every dry period to speed up the process. The year 1976 was ideal in this respect and it appears that this year records were set for the amount of peat moss disposed of by fire.

A relatively minor, but highly visible contribution to the smoke problem was the burning of crop residue by farmers. Straw production was very heavy in 1976 and many farmers decided to burn the swath after completion of the harvest. In addition, there was the usual clearing of road sides and ditches by burning and the burning of forage crop residue. In contrast to the peat fires, the other fires are normally of high intensity and short duration. Although quite extensive, they contribute little to the smoke problem except that some reportedly burned out of control and ignited adjacent brush or peat deposits.

Traffic accidents, caused by reduced visibility on the highways, were the most serious consequences of the smoke. In

1976 alone, three people were killed and 61 injured; over 200 vehicles were damaged and the damage was estimated at $180,000.

It should be emphasized that the hazard caused by peat smoke can not be considered on par with other road hazards such as rain, snow or fog. A motorist can cope with the latter by taking the necessary safety precautions. But wnen smoke builds up in an inversion in relatively still air and subsequently moves with a light breeze, zero visibility conditions may occur instantly on nearby roads. Motorists caught in such smoke often cannot see the outlines of their own vehicle and are unable to proceed forward or backward; they even hesitate to pull off the pavement without assistance. And while stopped on the pavement a vehicle is easily hit, usually from behind. This happened in both fatal accidents, near Richer and near Pinawa. In the hours of darkness a motorist may become trapped in the smoke without any warning at all.

Where possible, the R.C.M.P. traffic patrols and local detachments stopped motorists and guided them through the smoke area. This frequently required walking with them and providing hands-on guidance through the dense clouds. In the major peat fire areas this became a nightly routine and required considerable manpower commitment. Even so, the unpredictability of the occurrence of dense smoke often made it impossible for the R.C.M.P. to act in time to prevent accidents.

Considerable concern was expressed about the effect of the smoke on public health. But medical evidence at the hearings indicated that, with two general exceptions, no health problems could be attributed to exposure to the smoke. The one exception

concerned people living in the immediate vicinity of the peat fires where they were engulfed by thick smoke for prolonged periods of time. In these areas a number of medical problems were encountered and at least one family had to be evacuated under the direct medical order of their physician. The other exception concerns people who already suffer from chronic pulmonary ailments or allergies. Medical evidence shows that such people are prone to have aggravated symptoms upon exposure to smoke. Several patients of the Pine Falls General Hospital had their hospital stay extended because of smoke irritation and some patients moved out of the area.

The fires caused considerable property damage, as could be expected. The most serious damage was probably that caused to good agricultural peat land that happened to be underlain by inferior subsoil. In the Stuartburn area 7000 acres of productive agricultural land were stripped of peat moss by fire, leaving behind a nearly worthless substratum of rocks and stones. As a result, two farms in that area were put out of business.

Chapter 4

PROBLEMS WITH THE PRESENT FIRE CONTROL SYSTEM

The drought of 1976 underscored many serious shortcomings in the control of non-structural fires outside the Wooded District.

The Wooded District is so designated under the provisions of the Fire Prevention Act. It normally covers the area east of Marchand and Allegra in the south-east; north of Washaw Bay and Fisherton in the Interlake; and generally north of Garland and Winnipegosis in Western Manitoba, covering the entire area up to a line approximately at the latitude of Gillam, at or near the tree line in Manitoba. In the spring of 1977 the wooded district was temporarily extended in the south-eastern part of the province up to the Red River to provide authority for dealing with peat fires which were still burning.

Fire protection in the Wooded District is well organized. The Department of Renewable Resources and Transportation Services, which administers the Fires Prevention Act in the Wooded District, has the responsibility as well as the power to carry out fire prevention, fire detection and fire control functions. In the closed season, normally from April 1 to November 15, no fires may be set without a permit. In addition, the Provincial Forester may at any time forbid the setting of open fires. He can also control access to any part of the forests by declaring this a travel permit area. Permits can be withheld and travel restricted as the Provincial Forester sees fit.

On all private or leased land in the Wooded District, the onus is first of all on the occupant to prevent the spreading of fire from his land. Similarly, any municipality, within or

partly within the Wooded District, is responsible for fire prevention and control within its boundaries. The Fires Prevention Act requires such municipality to pass whatever bylaws are necessary for the fulfilment of this obligation. The Act allows the municipality to enter into an agreement with the minister for the prevention and control of wildfire. But when municipalities or individuals fail to take what the forest officer considers adequate action, then he may step in and do whatever he deems necessary to control and extinguish a fire. Thus the legislation contained in the Fires Prevention Act enabled the Forest Protection Branch of the Department to deal effectively with the many fires which occurred in the Wooded District in 1976.

By comparison, wildfire control outside the Wooded District is haphazard. This was evidenced by the fact that, at the time of the hearings, several fires were still burning without any authority taking any action to control them. This included the peat fire near Richer which had burned since midsummer and which had claimed two lives in a traffic accident. This fire and others had grown to almost unmanageable proportions, whereas at the time of detection they could have been controlled with relatively little cost and effort.

The Commission identified three main aspects to the problem of proper control, which will be discussed below in some detail. They are:

(1). Some fires, deliberately set by the owner of the land to achieve a useful purpose, create hazards to others and damage to the community which far outweigh any benefits. At the

present time there is no legal mechanism to disallow such fires (2). There is insufficient assurance that adequate precautions are observed to prevent legitimate fires from getting out of control and from creating hazardous conditions for others. (3) When a fire is out of control, or has been set accidentally, there is not always a responsible person or agency ready and prepared to take appropriate action.

Concerning the first aspect, the freedom to burn, at the present time a person may set fire on his own land at any time provided he surrounds it by a ploughed fireguard, not less than 20 feet wide, as required by Section 7(1) of the Fires Prevention Act. The Act states that the instigator must prevent the fire from spreading to the injury of the property of others and he could, of course, be held liable in court for any harm or damage done.

The freedom the law gives the individual to decide whether or not to burn presupposes that, by taking reasonable precautions, damage and harm to others can be prevented. With peat fires this is not so. Thick smoke, emanating for weeks, is an inevitable consequence of the burning of peat in situ and the serious hazards the smoke creates on nearby roads during inversions are not preventable.

Moreover, more than private interest is at stake when peat soils are burned off. In the expert opinion of the Department of Agriculture the burning of peat is a destructive practice which should be discontinued in the general interest.

Finally, it should be recognized that circumstances and times may make fire hazards so great that any open burning must

be disallowed in the general interest.

Legislative curbs on the types of fires permitted and any desired condition can be imposed by the municipalities who under the Municipal Act can pass any bylaws concerning fire control. However, no municipality has availed itself of this opportunity and it is unlikely that any will.

Concerning the second aspect of the fire control problem, the necessary precautions, present legislation outside the Wooded District is equally deficient in this. The Fires Prevention Act merely prescribes a 20-foot wide ploughed fire guard, which is totally inadequate for peat fires. The requirement relates to the burning of crops or stubble, or clearing land, but is certainly not adequate for many field and weather conditions that could prevail. A major shortcoming is that there is no requirement for continuous supervision while the burning is in progress. Moreover, if the person responsible for the fire chooses to ignore the fire guard requirement altogether, then he is liable to a fine of only $100 or $300 in the event the fire spreads and damages forest or property.

Evidence showed many persons, who regularly set fires, to be ignorant of the requirements of the Fires Prevention Act about a fireguard. This is small wonder since the setting of fires outside the Wooded District is treated entirely as an individual responsibility, which does not even require notification of the municipality or the fire guardian.

The third aspect of the fire control problem is that the detection of wildfire is not always followed by appropriate action. It is agreed that fire control outside the Wooded

District is a municipal responsibility. But present legislation does not oblige such a municipality to pass the necessary bylaws or to take any other action to prevent or to control wildfire. Strictly speaking, municipalities do not even have authority to enter private property for the purpose of fighting a fire, without passing the necessary bylaw.

The Commission has found no disagreement with the primary fire control responsibility being in the hands of the municipalities. The basic problem is that there is no agency empowered to step in and take action in the event that a municipality is unwilling or unable to deal adequately with the wildfire.

As it is, few if any, municipalities have a bylaw dealing with the prevention, detection and control of fires. None, as far as the Commission could determine, have any bylaw aimed specifically at wildfires. This does not mean that all municipalities have an irresponsible attitude towards wildfire control. Each municipality annually appoints fire guardians as required by Section 14 of the Fires Prevention Act. These fire guardians are empowered to requisition tools and equipment as well as personal assistance for the purpose of fire fighting. And it appears that, particularly outside the peat areas, many municipalities do take proper action when a fire is out of control.

But fighting wildfire, outside the Wooded District, is a voluntary effort on the part of the municipalities. If for some reason they decide to take no action then the fire will remain unattended till it burns itself out or is extinguished by rain. And there may be good reasons for a municipality not to get

involved. Fire departments in villages and towns have been organized mainly to fight stuctural fires. As a rule their equipment does not have cross-country capability and most fire trucks cannot move while their pumping equipment is operating. The water carrying capacity of the fire trucks is mostly inadequate for wildfire control. Thus municipalities are generally able to cope only with grass and prairie fires in readily accessible areas. Peat and brush fires in remote and broken terrain, on the other hand, illustrate the circumstances where municipal fire capabilities are quite inadequate. In addition, there is an understandable reluctance to commit equipment to the control of major wildfires if this would mean a substantial risk to the equipment and perhaps leave the dwellings in the towns and villages unprotected.

Conditions determining fire hazard vary very much across the province and in many parts the municipal equipment may be quite adequate for the type of fire that may occur especially since good progress has been made in establishing Mutual Aid Districts for the interlocking of fire fighting support. But even there the need exists for municipal bylaws that would ensure legal access and that would allow the prescribing of necessary precautions. Such bylaws would bring about a greater awareness of the risks and would more clearly show up any irresponsible behaviour in the setting of fires.

Chapter 5

THE SMOKE PROBLEM AND THE CLEAN ENVIRONMENT ACT

In his letter to the Commission the Minister reqested specifically that the Commission investigate the relation of the smoke problem to Section 1(d) of the Clean Environment Act. This section reads as follows:

1(d) "contaminant" means any solid, liquid, gas, waste, odour, heat, sound, vibration, radiation, or a combination of any of them that

(i) is foreign to or in excess of the natural constituents of the environment; or

(ii) affects the natural, physical, chemical, or biological quality of the environment; or

(iii) is or is likely to be injurious to the health or safety of a person; or

(iv) is or is likely to be injurious or damaging to property; or

(v) is or is likely to be injurious or damaging to plant or animal life; or

(vi) interferes or is likely to interfere with visibility; or

(vii) interferes or is likely to interfere with the normal conduct of business; or

(viii) interferes or is likely to interfere with the comfort, well-being or enjoyment of a person;

and "contaminate" has a similar meaning;

It is quite evident that the smoke, as experienced in 1976, is a contaminant under the Clean Environment Act; it qualifies in fact under several subheadings of the section quoted above.

However, for the Act to become operative, it must be shown that the contamination is "in excess of prescribed limits". Presently no limits have been prescribed on the emission of smoke in open burning.

The process of open burning could be brought under the control of the Act by enforcing Section 14(1) which reads:

> *Approval of proposal Required.*
>
> *14(1) No person shall, unless exempted under section 14.1 or by the regulations, construct premises or alter same or set into operation any industry, undertaking, plant or process that will or may result in the discharge or emission of any contaminant into the environment, unless he files his proposal with the department on a form approved by the minister; and upon the filing of the proposal the minister*
>
> *(a) may approve the proposal, provided the proposal complies with the provisions of the Act and regulations; or*
>
> *(b) subject to clause (a) shall refer the proposal to the commission to be dealt with in accordance with subsection (2) or (3).*

The procedure prescribed in section 14(1) is evidently far too cumbersome to control all open burning operations. In the absence of regulations, the Minister would be obliged to refer each case to the Clean Environment Commission. The route to be followed then would entail in each instance an environmental assessment by the Environmental Protection Branch, the advertizing of the proposal and possibly public hearings before the Commission could even begin deciding on the application.

It would make more sense to issue a regulation under the Clean Environment Act, which would exempt open burning for specified purposes from complying with Section 14(1), and which would specify in detail under what circumstances open burning would be permitted and what conditions would have to be met.

But there is much to be said for leaving the general

responsibility for fire control in the hands of the municipalities. They are aware of the local conditions and can set the rules accordingly. They have an immediate interest since they must live with the hazards and have, or should have, the obligation to respond to any fire that gets out of hand. They annually appoint fire guardians who are on the scene and can take both preventive and remedial action. Any new legislation should aim at strengthening the role of the municipalities rather than at taking over their function.

Only where the interests at stake obviously transcend municipal boundaries, as is the case with peat fires, or where municipalities fail to act adequately either in their regulatory capacity or in dealing with actual fire situations, should the Provincial Government step in. Specific recommendations concerning this are included later in this report.

Such supplementary legislation could take the form of a regulation under the Clean Environment Act. It could also be achieved by means of amendments of and regulations under the Fires Prevention Act, which is perhaps the more logical vehicle. To avoid ambiguity it may be advisable in any event to exempt legitimate open fires from complying with Section 14(1) of the Clean Environment Act.

Chapter 6

EVALUATION OF THE PURPOSES SERVED BY OPEN BURNING

Burning as a Means of Removing Peat

At one time over 70 percent of southern Manitoba east of the Red River was covered with peat deposits which accumulated over thousands of years in the low-oxygen environment of moist boggy areas. Much of it has been burned off in order that cereal crops could be raised on the underlying mineral soil and many thousands of acres of productive agricultural land testify to the success of this endeavour. But there is much peat left in layers which vary from a few inches to 10 feet or more. Farmers are still burning off peat whenever moisture conditions permit it and, as several testified at the public hearings, they regard this as not only a desirable, but indeed a necessary agricultural practice, which they fully intend to continue.

In this view the farmers are firmly opposed by the experts from the Manitoba Department of Agriculture and from the University of Manitoba, who flatly condemn the burning of peat as a destructive practice. The Commission has spent considerable time and effort in attempting to get to the bottom of this controversy.

The position of the Department of Agriculture is that the burning of peat soils destroys forever a valuable crop growth medium. Many peat areas are underlain by poorly drained clays which once formed the bottom of the shallow lakes in which the peat was formed; these clays are usually quite deficient in organic matter. Other peat areas are underlain by stony or

rocky soils that are totally unsuited for agriculture. Shallow layers of peat, worked into the mineral subsoil are an excellent growth medium and even deep peat can be extremely productive if the drainage is properly controlled. Peat soils are especially well suited for vegetables and forages but also cereal crops often produce well.

In addition, the Department of Agriculture points out that the burning of deep peat deposits lowers the land and often aggravates drainage problems. Concern was also expressed about the general loss of water storage capacity in the soil.

Many farmers, speaking from their own experience, considered the position of the Department an over-simplification. They pointed out that in many instances one could not raise cereal crops on peat grounds. The greater moisture content of the peat lengthens the time required for maturing to the point that in some areas the growing season is too short and frost becomes too great a hazard. In other areas the peat contains many tree roots and stumps which make it impossible to work the soil. Frequently, smaller peat areas have been left in sections previously cleared of peat by burning. This creates problems of unequal ripening of the crop. Some farmers pointed out that market conditions may make forage production economically unattractive and that there is no market for many specialty products that could be successfuly grown on peat. Strong feelings were expressed that farmers should be allowed to burn off peat at their discretion.

The Commission has the impression that from the viewpoint of agricultural productivity the case for or against burning

is somewhat mixed. It is difficult to deny that in some cases it would be in the interest of the farmer to get rid of his peat by burning. On the other hand, there was evidence that in some districts farmers have merely continued a traditional stand that any peat, even a thin layer, is better burned off.

It also appears that the blanket expert advice, not to burn, given by the Department, should be accompanied by advice to the individual farmer on how to make the best use of the peat lands he occupies, taking particular circumstances into account. It is noted that the Department's eastern region has conducted investigations of management practices on peat soils but that these have been going on for only the last two years.

The Commission considers it essential that the Department of Agriculture and the farmers, who after all share an interest in soil productivity, get together on this issue.

But there is more to the question of the burning of peat than just agricultural productivity.

Several presentations to the Commission pointed out that peat is a non-renewable resource, which can be put to many good uses. In its natural state a peat deposit grows at the rate of one to two millimeters per year, which for practical purposes is negligible. When disturbed or drained it stops growing and when it is cultivated it slowly disappears.

Peat is extensively used as a fuel in Ireland, Finland and the Soviet Union, among others for power generation. One variety, so-called spagnum moss, is packaged and sold as a garden soil conditioner and for many other purposes. The Manitoba production of spagnum moss was over 25,000 tons in 1975; this

represents a sales volume of nearly 2 million dollars.

While it is true that the burning of peat means the destruction of a non-renewable resource, this aspect should be kept in its proper perspective. There are almost 48 million acres of peat land in Manitoba of which there are 1.9 million acres in south-eastern Manitoba, the region where the burning of peat for agricultural purposes is at issue. Of these 1.9 million acres not more than 5 percent is in private ownership and of this the greater part undoubtedly has been cleared already. In other words, the peat moss at issue in the controversy about its removal for agricultural purposes probably amounts to less than 0.1 percent of the total peat moss resource in the province.

Farmers have assured the Commission at the hearings that burning in situ is the only practical way of getting rid of unwanted peat moss. This then raises two unresolved problems, namely, preventing the fire from spreading and the resulting smoke.

To appreciate the first problem one should realize that peat moss can only be burned when it is dry. In most years the peat is too wet and it could only be burned if scraped off and left to dry in windrows. This is considered to be too costly, so farmers must wait for very dry years to burn peat. At that time everything else is dry too and the problem of control arises. Peat fires will burn for weeks and there is a good chance that a strong wind arising during that time will make the fire jump any man-made fireguard. Once the fire has spread into the wooded peat soils it is nearly impossible to control. There was general agreement at the hearings that precautions taken

by individual farmers to prevent spreading of peat fires could not be relied upon.

The direct consequences of peat moss fires out of control may be quite serious as was demonstrated in 1976 by the fire near Stuartburn where the removal of 7000 acres of peat on productive agricultural land left completely useless soil behind and meant the end of two farmsteads.

The second unresolved problem with the burning of peat moss in situ is the smoke. In contrast to practically all other fires, peat burns very slowly, emitting vast quantities of thick smoke and steam. Most weather conditions cause the smoke to rise and dissipate into the atmosphere without causing serious problems. But when the temperature of the air aloft exceeds the temperature of the air near ground level, a so-called temperature inversion occurs. The smoke will then remain at ground level. Temperature inversions are quite common, especially in the late summer and fall. For example, in the period from September 1 to December 1 night time inversions occur 40 percent of the time and afternoon inversions 10 percent of the time in the Pinawa area. The smoke problem is compounded since inversions are usually associated with calm conditions or very light winds. It must therefore be concluded that serious hazards to motorists are an unavoidable consequence of the practice of burning peat moss in situ.

In summary, the Commission reached the conclusion that the hazards and detrimental consequences of the burning of peat moss in situ outweigh in general the advantages to the individual farmer engaged in the practice. The practice should therefore

be discontinued. The Commission realizes, however, that conditions are quite variable. A rigid rule, forbidding all such burning, may not make sense in all cases. Exceptions should therefore be allowed in specific instances after due investigation.

Burning of Crop Residue

The burning of straw after a crop has been harvested is still a wide spread practice in southern Manitoba in spite of strong expert advice against it. Together with the burning of remaining grass stands on native hay fields and pastures and the burning for weed control and general cleaning operations, the practice results in extensive smoke production. The combustible material, however, is usually dry and loosely packed. It therefore burns rapidly and is soon reduced to ashes so that the smoke is generally of a short duration. On the whole, this type of burning causes no serious problems to others, provided the fire is kept under control. But this will not always be the case. With widespread open burning one must expect that occasionally the fire will get away. The Commission has therefore given consideration to the questions (a) whether the practice is necessary, and (b) if so, if there is a need for stricter controls.

The Manitoba Department of Agriculture has taken the position that crop residues should be returned to the soil either immediately or after being used as feed or animal bedding. In general the Department opposes the burning of straw as a wasteful practice and detrimental to the soil.

The farmers making representations at the hearings did not disagree with this position as a general objective but pointed out that

(a) straw production in Manitoba greatly exceeds the requirements for livestock and other purposes especially in years like 1976;

(b) insufficient decomposition of the straw due to lack of moisture or nutrients may result in a highly pervious seed bed that does not retain the moisture necessary for the following crop;

(c) long straw must be chopped before it can be worked into the soil and not all farmers are equiped for this; even those that are, find that moisture conditions may make the straw too tough and the chopping too difficult an operation at times;

(d) flax straw takes too long to decompose.

On the basis of the evidence presented the Commission concluded that in individual cases there may be good reasons for burning. The decision to burn or not to burn should therefore be left to the farmer and legislation should focus on the control necessary to prevent the fire from getting out of hand.

The same holds for other uses of fire as a management tool in agriculture, such as the cleaning up of residues accumulated in fence rows, drains, etc., the burning of road ditches that are not accessible for mowing, the controlled burning of native pasture to suppress undesirable plant species, the removal of heavy grass stands on hay lands that could not be cut or grazed because of flooding, the combat of insect and disease problems in forage seed production, periodic burning for increased blue-

berry production, etc. Opinions may vary as to the necessity or even the desirability of burning, but the Commission feels that the decision should be the responsibility of the agricultural producer.

Present controls to prevent agricultural management fires from getting out of hand are minimal. The only specific requirement related to the spreading of fire beyond the property of the instigator is contained in Section 7(1) of the Fires Prevention Act. This section specifies a 20-foot wide, ploughed fireguard or equivalent around the fire. Furthermore, the Act contains general provisions prohibiting the setting out of fires that may run at large and requiring effective measures to prevent the spreading of fire to other persons' property.

A 20-foot wide fireguard may be adequate to contain crop residue fires under most circumstances. It is easy to envision, however, that weather and moisture conditions may at times make this provision entirely inadequate. Also, the section does not relate to fires the purpose whereof cannot be described as "burning crops or stubble or clearing land".

The Act does not specifically require supervision of the fire. The Commission considers that continued supervision, as well as the immediate availability of equipment for extinguishing fire is problably the most effective means of keeping a fire under control.

Specific suggestions to improve the control of agricultural management fires will be discussed in Chapter 8.

The Effect of Burning on Wildlife

Fires can be beneficial as well as harmful for wildlife. On the one hand, fires kill many animals and destroy valuable wildlife habitat. On the other hand, the rejuvenating effect of fire may greatly increase the productivity of feeding areas and thus raise their potential to sustain some forms of wildlife. One may therefore conclude that uncontrolled and indiscriminate burning is likely to be harmful but that controlled burning by knowledgeable people is a valuable wildlife management tool.

The Commission is of the opinion that periodic prescribed burning for the purpose of wildlife management in designated forests and marsh lands should be left to the discretion of those in charge of such areas. Other fires, however, set for different purposes also have their effect on wildlife. This effect will be considered briefly below.

Annual burning of vegetation along headlands, ditches, sloughs and ponds, if practiced in the fall, destroys the litter waterfowl need to build their nest. If practiced in the spring, it denies the waterfowl the necessary cover and may actively interfere with the nesting of thousands of upland game birds. Waterfowl are already severely stressed by drought and by improved drainage which allows cultivation of much land that formerly existed as sloughs and ponds. It is therefore important to avoid additional stress due to unnecessary and untimely burning.

However, there is no obligation on any person to preserve wildlife habitat on his private property. Protection of wildlife on private land must therefore be voluntary. The Commission is aware that many farmers do value wildlife on their property.

This gives the Commission confidence that public education and the dissemination of information about wildlife management on private property should go a long way in improving the situation.

Many damaging fires are the result of carelessness and insufficient control of deliberate burnings. An improvement in this respect will automatically result in a reduction of fire damage to wildlife.

Burning for Land Clearing, Right-of-way Maintenance and Private Waste Disposal

The construction of roads and reservoirs and the clearing of land for agriculture may necessitate the removal of brush by burning. This is an acceptable practice provided the material is properly windrowed and allowed to dry out thoroughly before it is lit and provided the necessary precautions are taken to prevent spreading.

Burning of brush for land clearing should not be undertaken if the subsoil is peat and the peat is dry enough to be ignited. The burning should be carefully controlled because of the large accumulations of combustible material involved. It should not be allowed without a permit or other notification of local authorities in charge of fire control nor should it be allowed without the presence of experienced supervision and suitable fire suppression equipment.

The burning of road ditches, road allowances, railway and other rights-of-way for the control of weeds and to prevent snow accumulation is seldom necessary if full use is made of

control by mowing and herbicides. However, apart from its effect on wildlife, there seems to be no major problem associated with the practice provided proper precautions are taken to prevent the fire from spreading. Private individuals should be discouraged from setting this kind of fire.

The burning of rubbish, leaves, grass and other combustible matter by private persons on their own property is common practice in rural areas. It creates no serious problems, provided that no oil, tar, asphalt, rubber, plastic or other heavy smoke producing material is burned in large quantities and provided that there is no danger of the fire spreading. This type of fire should not be allowed in built-up areas where the smoke may become a nuisance to neighbours or where the fire may endanger dwellings. Where permitted, the fire should be properly contained or fireguarded and continually supervised until extinguished.

Chapter 7

THE PREVENTION OF TRAFFIC ACCIDENTS CAUSED BY SMOKE

The most important steps in reducing smoke related traffic accidents are (a) reducing the number of peat and brush fires, and (b) bringing wildfires, especially those that may involve peat, speedily under control. Nevertheless, it should be realized that wildfires will happen, including peat fires, and that these may burn for a long time before they are put out. In the meantime, inversions may occur and hazardous conditions may prevail on nearby highways. At the public hearings several worthwhile suggestions were made on how to improve traffic safety under smoke conditions. These are passed on here.

Permanent or semi-permanent signs warning of possible smoke hazards were considered to be of little value. It appears that the public gets used to their presence to the point that the message no longer registers.

Smoke warnings carried by radio do tend to put the motorist on the alert and may induce him to postpone the trip or to follow an alternate route.

The most effective protection of the motorists is provided when the R.C.M.P. closes the length of highway affected by smoke at both ends and, when possible, guides cars through in convoys. But such action can only be taken if the R.C.M.P. is aware of the existence and location of smoke producing fires and of the probability of the occurrence of inversions.

The Commission learned that, while temperature inversions cannot be predicted with certainty, the Meteorological Branch

of the Department of Transport is quite capable of an accurate assessment of the likelihood of their occurrence within the next 12 to 24 hours. Thus one of the government agencies involved could be charged with the duty to coordinate the available information and to monitor the fire and smoke situation in order to assist the R.C.M.P. in exercising more effective control over traffic under hazardous conditions.

One final point should be mentioned in connection with smoke hazards to traffic. Evidence at the hearings showed that motorists, who find themselves caught in thick smoke, have the tendency to stop on the pavement instead of immediately moving off the pavement on to the shoulder. Near Richer this resulted in the death of two persons, whose car was struck from behind by another vehicle. Near Pinawa a young man died when his car ran into a truck which had stopped in thick smoke on the pavement. It would seem highly desirable that the public be impressed with, first of all, the danger of driving into the smoke, and, secondly, with the importance of getting off the pavement the moment it is no longer safe to proceed at a reasonable speed. It should also be realized that darkness very substantially increases the hazards.

Chapter 8

A SUMMARY OF THE NEED FOR LEGISLATIVE CHANGE

Four main issues arise from the smoke problem and have prompted lively discussion at the public hearings. They are: (a) the right to burn, (b) safeguards and precautions, (c) municipal responsibility for fire control, and (d) municipal wildfire fighting capabilities. In this chapter the Commission has summarized its findings on these issues. Chapter 9 contains specific recommendations based thereon.

The Right to Burn

The Commission is of the opinion that in rural Manitoba the property owner or occupant should be allowed the use of fire as an agricultural management tool to the extent this is compatible with the rights of others. The Commission realizes that ignorance or traditionalism will at times cause persons to use fire where it would be in their best interest not to do so. But this should be rectified by the dissemination of pertinent information rather than by prohibition. Moreover, the Commission finds that it is impossible to define in general rules what in specific instances constitutes good agricultural practice. In general, the decision to burn or not to burn should be left to the agricultural producer and legislation should be directed towards the prevention of spreading and the reduction of hazards and nuisance to others.

The only exception the Commission wishes to make is the burning of peat in situ. With all other types of fire, if properly

guarded, the hazard and inconvenience to others was found to be relatively minor. Peat fires entail, in many cases, an unacceptable hazard of spreading and an unavoidable occurrence of thick smoke which may seriously endanger traffic.

The Manitoba Department of Agriculture has flatly condemned the burning of peat as a destructive practice which cannot be justified on agricultural grounds. Evidence at the hearings indicated that this condemnation is probably too sweeping to be applicable to all actual cases and there may well be exceptions to the rule. These exceptions, however, should be treated as such.

Moreover, the burning of peat changes the nature of the land irrevokably and affects not only the present owner or occupant but future generations as well. For this reason the Commission feels that the decision to burn or not to burn should not be based solely on the perceived interest of the present owner or occupant but should take into account the interest of the community at large.

The Commission is therefore of the opinion that in general the burning of peat deposits should be prohibited. The Commission suggests that exceptional cases, where it is claimed that burning is necessary and can be done safely, be dealt with by application to a government appointed board consisting of personnel from the departments involved. A prerequisite for a burning permit would then be the approval of this board and a statement issued by the board specifying the conditions that would have to be met.

Precautions and Safeguards

In the Wooded District the legislation concerning fire prevention, detection and suppression appears to be adequate except for minor points which, the Commission understands, are under review. The Commission is of the opinion that the same legislation should apply to all major peat areas of the province. This could be accomplished simply by keeping the enlarged wooded districts, as established by Manitoba Regulation 45/77, unchanged for this would make the peat areas permanently part of the Wooded District. This would serve the following ends:

(a) It will enable the Fire Protection Branch of the Department of Renewable Resources and Transportation Services to take preventive and protective measures in the peat moss areas under the Fires Prevention Act.

(b) It will provide a buffer zone around the peat moss areas and provide greater protection against the accidental spread of fires from adjacent agricultural land into peat moss areas.

(c) It will encompass almost all local government districts which do not have the capability for fire prevention and suppression.

Outside the Wooded District a distinction should be made between fires used by the householder for the disposal of combustible waste or other domestic purposes, and fires set for land clearing, weed control or agricultural management.

Domestic fires should be controlled by a simple regulation requiring containment, continuing supervision and dousing of remaining embers, but no permit should be needed.

All fires for land clearing, weed or insect control, or agricultural management should be registered with the municipality with a description of the location, the type of burning and the precautions taken or to be taken to prevent spreading. This registration of intent can be done well in advance of the actual burning and need not be repeated if periodic burning is practiced. Prior to starting the fire the municipal office is to be notified with reference to the registration number. The fire guardian responsible for the area should be empowered to prohibit at all times the starting of a fire if, in his opinion, the precautions taken are not adequate, or weather and moisture conditions make open burning too hazardous.

Legislation should specify the requirement of continued supervision and the availability of suitable fire suppression equipment so that immediate action can be taken if spreading occurs.

Municipal Responsibility and Central Authority

At the public hearings the president of the Union of Manitoba Municipalities has forcefully stated that the primary responsibility for fire prevention, detection and suppression within municipal boundaries must remain with the municipalities. The Commission agrees with this concept. However, the evidence has clearly shown that there is a need for over-riding provincial authority to ensure that appropriate action will be taken in the event that a municipality fails to deal adequately with a fire situation.

In the Wooded District such authority has been vested in

the Provincial Forester through a provision in the Fires Prevention Act and this provision apparently has worked well. The Commission suggests that outside the Wooded District the same pattern be followed. There should be one minister who has the final responsibility for fire control and on whose behalf a designated officer can take all necessary action.

The Commission further suggests that, in the event a municipality does not pass the bylaws enabling it to deal effectively with fire prevention and suppression, the minister be empowered to create the necessary local fire control legislation.

The Commission notes that encorporating the peat areas permanently in the Wooded District will substantially reduce the problem since peat fires create the greatest hazards and are the most difficult to control.

Municipal Wildfire Fighting Capability

Municipal fire fighting capabilities rest mainly on volunteer fire departments in villages and towns. These departments have been organized primarily to fight structural fires. As a result, their equipment and training are not oriented towards the control of wildfire.

At the public hearings the Fire Commissioner presented a brief to the Commission pointing out numerous shortcomings and problems in this respect. He also made many valuable suggestions, concerning equipment, water supply, fire prevention and the training of personnel. Rather than repeating these suggestions here, the Commission suggests that the Fire Commis-

sioner in cooperation with the Forest Protection Branch and perhaps other departments, be instructed to instigate and organize a program aimed at upgrading the capabilities of the municipalities to deal with wildfire. This program should include the development of guidelines for municipalities dealing with prevention, early detection and suppression. It should also provide guidelines for the users of fire to promote that best practices be followed.

In connection with this program the Commission suggests that the Provincial Government provide municipalities that are prepared to cooperate in the program with the financial assistance necessary to procure the additional fire suppression equipment needed to do the job.

Chapter 9

RECOMMENDATIONS

1. The Commission recommends that the enlarged Wooded District, as established by Manitoba Regulation 45/77 remain unchanged.

2. The Commission recommends that the burning of peat moss deposits be prohibited, subject to a provision for exceptional cases in which the proposed burning is demonstrated to be an acceptable agricultural practice which can be executed with safety. The Commission recommends further that a Board be appointed, consisting of personnel from the Department of Agriculture and the Department of Renewable Resources and Transportation Services for the purpose of assessing applications for the burning of peat deposits. No burning permit should be issued for this purpose without the approval of this Board and a statement of the conditions that must be met.

3. The Commission recommends that, outside the Wooded District, all burning to be carried out by private persons on the land they occupy, except fires that are legally defined as for domestic purposes; as well as all burning to be carried out by agencies of the Crown or crown corporations, be registered in advance with the municipality within which boundaries the burning is to take place. The registration should state the location, the material to be burned, the precautions to be taken to prevent spreading, and the supervision and fire suppression equipment that will be on hand. It should also state whether the burning is to be repeated later.

If the burning is intended to be periodic then the registration need not be repeated each time. However, the municipal office must be notified in advance each time a registered fire is ignited.

The Commission recommends that the municipal fire guardian in charge of the area be given the authority to prohibit any open fire at any time if, in his opinion, precautions are insufficient or the weather and moisture conditions would render the fire hazardous.

Concerning domestic fires, set by the rural householder on the land he occupies for the purpose of disposing of combustible waste or for other domestic purposes, the Commission recommends that these be controlled by a regulation under the Fires Prevention Act.

4. The Commission recommends that the necessary legislative changes be incorporated in the Fires Prevention Act and that one minister be made responsible for all fire control under the Act.

The Commission further recommends that, outside the Wooded District, the primary responsibility for fire prevention, detection and suppression remain with the municipalities. However, the minister responsible for fire control, or his designate, should have the statutory authority and the responsibility to deal with a fire situation if, in his opinion, the action taken by a municipality is inadequate. The cost should be borne by the municipality. In addition, the minister should be empowered to supplement local fire control regulation in

the event that a municipality has failed to pass the bylaws necessary to enable it to deal effectively with the prevention, detection and suppression of fires.

5. The Commission recommends that provision be made in the legislation to ensure the right of access onto private land for the purpose of the removal of fire hazards or for the suppression of fire.

6. The Commission recommends that the penalties for violations of the Fires Prevention Act be increased and that the provisions dealing with them be simplified.

7. The Commission recommends that a program be instigated to upgrade the capabilities of the municipalities to deal effectively with wildfire. This program should include the development of guidelines for municipalities dealing with prevention, early detection and suppression. It should also provide guidelines for fire users to promote that best practices be followed.
The Commission also recommends that the program for the establishment of mutual aid districts be given a high priority.

8. The Commission recommends that the Provincial Government provide the municipalities with financial assistance for the acquisition of fire fighting equipment suitable for suppressing prairie, bush and peat fires.

Appendix A

MANITOBA

MINISTER
MINES RESOURCES AND ENVIRONMENTAL MANAGEMENT
WINNIPEG
R3C 0V8

November 8th, 1976

Mr. G. E. Moore, Chairman,
Clean Environment Commission,
Box 4, Building 2,
139 Tuxedo Avenue,
WINNIPEG, Manitoba.
R3C 0V8

Dear Mr. Moore:

There has been concern expressed respecting the presence of smoke in Southern Manitoba during the past two months and investigations by this Department have revealed that the problems are related to peat moss and brush fires as well as the traditional stubble burning practice by agricultural producers. Both problems have been intensified by the extremely dry soil conditions and unfavourable weather conditions.

As a result of these problems I am requesting the Clean Environment Commission to investigate this matter and to hold public hearings pursuant to Section 13(1) of the Clean Environment Act and provide me with a report and recommendations as soon as possible so that any required legislative or regulation change could be made prior to next season.

I would ask that the Commission place emphasis upon:

1) Defining the source of the problem,

2) Defining the problem and its relation to Section 1(d) of the Clean Environment Act,

. . . 2

G. E. Moore, Chairman

3) Determining whether legislative controls are recommended and, if deemed advisable, what form such controls should take,

4) Ensuring that the public hearings provide all interested parties an opportunity to present comments.

Yours sincerely,

Sidney Green,
Minister.

Appendix B

Exhibits of the Hearings

No. 1 Representation of Mr. Munroe, Chairman of the Pine Falls Hospital Board.

No. 2 Letter from W. G. Buchanan, Chief Superintendent, Officer in Charge, Criminal Investigation Branch, Royal Canadian Mounted Police with attached accident statistics, submitted by Larry Strachan.

No. 3 Representation of Mr. Rod Seimens on behalf of the Manitoba Department of Agriculture submitted at Lac du Bonnet, December 7, 1976.

No. 3B Further representation of the Department of Agriculture submitted at Teulon, January 5, 1977.

No. 4 Letter from the Pine Falls Hospital to the Air Pollution Control Section submitted by Larry Strachan.

No. 5 Fire areas depicted on overhead slides and summary of ambient air quality in Winnipeg on three particular days. (See Appendix A of Exhibit No. 74) submitted by Larry Strachan.

No. 6 The Clean Environment Commission advertisement of the Smoke Investigation Hearings.

No. 7 Letter from Mr. E. E. Robertson, P. Eng., Executive Director, The Biomass Energy Institute Inc. to Mr. H. M. Sleigh with a submission *Prospects for extinguishing peat fires employing indigenous sand resources and some resultant benefits.*

No. 8 Diagram of a line source of smoke submitted by Einar Einarsson, Atmospheric Environment Services. (See Exhibit No. 75)

No. 9 *Anoka Peatland Project 1975* publication received from the University of Minnesota.

No. 10 Publication received from the Department of Natural Resources November-December 1976 edition of *The Minnesota Volunteer*.

No. 11 Letter submitted by Dr. Pagtakhan who is the physician treating Mr. McKay's daughter for respiratory problems.

No. 12 Blank sample of form MNR-fp-14 *Permit to Burn*.

No. 13 Newspaper photo, The Carillon, December 8, 1976, submitted by Mr. Seimens, of rocky burned out peat area.

No. 14 Submission made by Mr. Chapman on behalf of the Union of Manitoba Municipalities on *Open Burning*.

No. 14A Copy of Resolution No. 6 passed in Council December 14, 1976, by the Rural Municipality of Daly.

No. 14B Copy of Resolution No. 24 of the Rural Municipality of Riverside on Wildlife Management Areas.

No. 15 Map prepared by the Department of Agriculture submitted by Mr. Partridge *Patterns of the Percentage of Farmers Carrying Out Stubble Burning in Manitoba in 1976.*

No. 16 Representation of Wayne Cowan of Ducks Unlimited *Effects of Agricultural Burning on Duck Production in Southwestern Manitoba - By Ducks Unlimited (Canada).*

No. 17 Glossary of Forest Fire Control Terms, National Research Council, January 1963.

No. 18 Directory of Fire Control Personnel, Canadian Committee on Forest Fire Control, 1976.

No. 19 Map of Agricultural Crown Lands submitted by Mr. W. L. Cotton, Inspector with the Agricultural Crown Lands.

No. 20 Part of a report prepared by Graham Sommers, Assistant Director, Agricultural Crown Lands Section, submitted by Mr. Partridge *Putting Out Fires on ACL Leases.*

No. 21 Presentation by Mr. Ransom on behalf of the Turtle Mountain Resources Conservation District.

No. 22 Letter to be submitted to the Commission by Mail from Dr. Povah who is treating Mr. Roy Brown.

No. 23 *Manitoba Report of Fire Losses and Fire Services,* Wright and Underwriters Association submitted by Mr. Hewitt.

No. 24 Model by-laws recommended by the Manitoba Fire Commissioner's Office for Locals.

No. 25 Pamphlet *Farm Fire Safety.*

No. 26 Letter from Mrs. Georgina Boux of Brandon to Honourable Sidney Green submitted by Larry Strachan with attached editoria.

No. 27 Representation of Mr. Pat Caldwell, Ducks Unlimited (Canada) submitted at Carman, January 4, 1977.

No. 28A Publication presented by Mr. Peter Ward *Fire in Relation to Waterfowl Habitat of the Delta Marshes.*

No. 28B *Effects of Agricultural Burning on Nesting Waterfowl* by Erik Fritzell.

No. 29 Representation of Mr. Wes VanStone on behalf of the Pembina Valley Tourist and Convention Association.

No. 30 Newspaper clippings, Winnipeg Free Press, December 27, 1976, *Peat Fires, North Farm, Zhoda, Manitoba.*

No. 31 Letter from Barry B. Bannatyne dated December 26, 1976, with an enclosure *MEA 9 - Peat Project* by B.B. Bannatyne.

No. 32 Accident report dated August 26, 1976, submitted by Mr. McKibbin of the Department of Highways.

No. 33 Submission by Allan Jeffrey, Chief of Forest Protection, Department of Renewable Resources and Transportation Services *Peat Fires*.

No. 34 Brief by Mr. Edward Peltz, Farmer, Warren, Manitoba and Reeve of the Rural Municipality of Woodlands.

No. 35 Brief presented by Mr. Matt Golas, Certified Forage Seed Grower.

No. 36A Paper presented by Stan Caldwell, Ducks Unlimited *Use of Fire In Wildlife Management* by Howard A. Miller.

No. 36B Paper presented by Stan Caldwell, Ducks Unlimited *Prairie Fires and Wildlife* by Leo M. Kirsch and Arnold D. Kruse.

No. 37 *Proceedings of the Seminar on Peat: A Resource in Manitoba's Agriculture and Industry* Edited by Dr. J. D. Campbell submitted to the Commission by Biomass Energy Institute Inc.

No. 38 *Bord Na Mona* magazine published in Ireland, submitted by Biomass Energy Institute Inc.

No. 39 Publication of the State of Minnesota Department of Iron Range Resources and Rehabilitation *Feasibility of Reducing Production and Distribution Costs of Minnesota Peat to a Competitive Level* submitted by Biomass Energy.

No. 40 Submission by Dr. C. P. W. Warren, M.B., F.R.C.P.(C), Assistant Professor, Department of Medicine, University of Manitoba *The Effect of Smoke from Burning Stubble, Bush and Bogs on Human Health - The Lungs*.

No. 41 Submission by Robert E. Jones, Manage, Delta Marsh Project, Department of Renewable Resources and Transportation Services, *Use and Problems of a Wildland Management Tool - Fire*.

No. 42 Publication by Harold A. Leverin *Peat Moss or Sphagnum Moss - Its Uses in Agriculture, in Industry, and in the Home - 1945* submitted by Biomass Energy Institute Inc.

No. 43 Bulletin No. 48-1 of the Department of Mines, Resources and Natural Resources 1948 *Peat Moss in Manitoba* submitted by Biomass Energy Institute Inc.

No. 44 Submission to The Clean Environment Commission Hearing on Smoke Conditions in Manitoba presented by Office of the Manitoba Fire Commissioner, Department of Labour.

No. 45 *The Story of Turf in Ireland* Magazine submitted by Biomass Energy Institute Inc.

No. 46 Submission to The Clean Environment Commission by the Department of Renewable Resources - Wildlife Programs *The Effects of Fire on Wildlife in AGRO Manitoba*.

No. 47 Letter from R. E. Stenberg, Minnesota Department of Transportation, giving location of fire or smoke hazards with map plotting locations.

No. 48 **Magazines published by the Office of Iron Range Resources and Rehabilitation submitted by Biomass Energy Institute Inc.**

A *Peat - Resources of Minnesota - Potentiality Report Fens Bog Area St. Louis County, Minnesota*

B *Peat - Resources of Minnesota - Report of Inventory No. 1 - West Central Bog, St. Louis Co., Minnesota*

C *Peat - Resources of Minnesota - Report of Inventory No. 2 - Cook Bog St. Louis Co., Minnesota*

D *Peat - Resources of Minnesota - Report of Inventory No. 3 - Red Lake Bog, Beltrami Co., Minnesota*

No. 49 Submission from E. Kucera, Wildlife/Environment Research Biologist *Smoke in the Air from Open Burning.*

No. 49A Submission from Dave Wotton, Forestry Research Specialist, Environmental Research & Development *Environmental Effects of Burning on Plant Life.*

No. 50 Article from Scientific American *Agriculture Without Tillage* by Glover B. Triplett, Jr., and David M. Van Doren, Jr., submitted by Biomass Energy Institute Inc.

No. 51 Publication of the University of Minnesota *Potential of Peat For Fuel* by R. S. Farnham, Professor of Soil Science submitted by Biomass Energy Institute Inc.

No. 52 Publication of Bureau of Mines Bulletin 650 *PEAT - A Chapter from Mineral Facts and Problems, 1970 Edition* submitted by Biomass Energy Institute Inc.

No. 53 Article from The Journal of the Australian Institute of Agricultural Science - March 1976 *Utilization of Cereal Straw: A Scenario Evaluation* by D. J. McCann and H. D. W. Saddler submitted by Biomass Energy Institute Inc.

No. 54 Publication of National Research Council *A Preliminary Annotated Bibliography on Muskeg* September 1955 compiled by I. C. MacFarlane submitted by Biomass Energy Institute Inc.

No. 55 Submission by Larry Strachan, Air Pollution Control Section, Environmental Management Division, for Dauphin, January 12, 1977, *Smoke and Air Pollution.*

No. 56 Brief to The Clean Environment Commission Presented by Ducks Unlimited (Canada) *Is All That Burning Really Necessary?.*

No. 57 Publication of the Department of Renewable Resources and Transportation Services *The Story of Forest Fire Control in Manitoba.*

No. 58 Final Report *Manitoba Peats for Water Purification* by Frank A. Henning submitted by Biomass Energy Institute Inc.

No. 59 Publication 63-5 of the Department of Mines and Natural Resources *Preliminary Survey of Bogs For Peat Moss in Southeastern Manitoba* by Barry B. Bannatyne, Winnipeg, 1964, submitted by Biomass Energy

No. 60 Submission by Peter Kiez, Agricultural Representative, Dauphin *1976 Peat Survey*.

No. 61 *Agenda of Seminar on Land Use* personally endorsed by Reverend Gould.

No. 62 Memorandum from C. Froese, Land Inspector to Dale Partridge *Land Clearing*.

No. 63 Submission by Peter Ward, Director, Delta Waterfowl Research Station *The Use of Fire in Marsh Management*.

No. 64 Report of the First World Straw Conference, Eugene, Oregon, May, 1975, submitted by Biomass Energy Institute Inc.

No. 65 Publication *Grown Organic Matter As A Fuel Raw Material Resource* by Warren L. Roller, Ohio Agricultural Research and Development Center submitted by Biomass Energy Institute Inc.

No. 66 Paper No. 75-107 *Feasibility For Energy Recovery From Cereal Crop Residues* Department of Agricultural Engineering, University of Manitoba submitted by Biomass Energy Institute.

No. 67 *The Heat Value of Various Agricultural Crop Residues and Sewage Sludge Compost* by Jacob L. LaRue submitted by Biomass Energy Institute.

No. 68 *Energy and Agriculture* by C. G. E. Downing and M. Feldman, Research Branch, Agriculture Canada, Submitted by Biomass Energy Institute Inc.

No. 69 *The Briquetting of Straw* by Laboratories of the National Research Council of Canada submitted by Biomass Energy Institute Inc.

No. 70 United States Patent *Straw Briquetting Machine* January 10, 1922.

No. 71 Submission by C. J. Phelan, President, Manitoba Motor League.

No. 72 Memorandum from Larry Strachan *Survey of Fires in Manitoba*.

No. 73 Chapter F80 of the Manitoba Statutes *An Act for the Prevention and Suppression of Fires*.

No. 74 Submission by Larry Strachan *Smoke and Air Pollution*.

No. 75 Submission by Scientific Services, Central Region, Atmospheric Environment Service *Report on the Meteorological Aspects of Smoke Conditions Associated with Ground Fires in Southeastern Manitoba - 1976*.

No. 75A Amendments to Exhibit No. 75.

No. 76 Publication of Minnesota Energy Agency January 1976 *Peat - Technology Transfer Visit to Europe, Fall, 1975*.

No. 77 Publication of Minnesota Energy Agency *Peat in Minnesota - An Assessment*.

No. 78 Memorandum from W. K. Webster, Assistant Deputy Minister, Operations Division, Department of Renewable Resources and Transportation Services *O/F.P. - Fires Prevention Act.*

No. 79 Submission by J. D. Campbell, Professor of Horticulture, Retired, *The Burning of Peat Moss in Manitoba.*

No. 80 Submission by Minnesota Department of Natural Resources *Peat Fires.*

No. 81 Pamphlets submitted by Mr. Mueller of Manitoba Telephone System:

A *Hydro-Ax - The Trail Blazer*

B *The Kershaw Klear-Way*

C *Prime Mover 300 and 700 Series*

No. 82 Statistics on accidents submitted by Mr. Adamson of the Department of Highways.

No. 83 Report on pole fires submitted by Mr. Prior of Manitoba Hydro.

No. 84 Submission by Mr. Brockhouse of Canadian Pacific Railways concerning their burning practices.

No. 85 Submission by Mr. Cvitkovitch on behalf of the estate of J. and A. Hillcoff.

No. 86 Letter from the Manitoba Health Services Commission to L. Strachan of the Air Pollution Control Section dated 76 12 15.

No. 87 Submission by Dr. D. Kraft and Dr. D. Schulte of the Agricultural Waste Management Committee, Faculty of Agriculture, University of Manitoba *The Burning of Crop Residues and Peat.*

No. 88 Accident Statistics submitted by S/Sgt. Pavelick of the Royal Canadian Mounted Police.

No. 89 Submission by Reeve Sigurdson, Rural Municipality of Caldwell with a copy of a bulletin published by the Municipality and a certified copy of a resolution.

No. 90 Submission by B. R. Tymchuk of the Canadian National Railways.

No. 91 Letter from Mr. Don Biglow, Manager, Western Peat Moss Ltd. of December 23, 1976.

No. 92 Letter from Mr. E. J. Woloskoski dated January 7, 1977.

No. 93 Letter from P. J. Caldwell, Ducks Unlimited with attached article from Conservation Comment *Fire as a Land Management Tool* by Ted Muir.

No. 94 *Another Look at Zero Tillage* by B. Lyster, article from Country Guide Magazine, January 1977.

No. 95 Submission by H. M. Fraser, Atmospheric Environment Service, Environment Canada *The Dry Fall of 1976 and Its Implications.*

No. 96 Newspaper article from Steinbach Carillor, *Juvenile Convicted After Bush Fire.*

No. 97 Letter from A. W. Goettel, Soils Branch, Alberta Department of Agriculture to Mr. J. R. D. Partridge dated October 27, 1976.

Appendix C

MANITOBA (logo)

THE CLEAN ENVIRONMENT COMMISSION

INVESTIGATION OF SMOKE CONDITIONS

Pursuant to the provisions of The Clean Environment Act, The Clean Environment Commission will hold public hearings to investigate the presence of smoke in Southern Manitoba during the past several weeks.

Purpose of Hearings

- To hear representations and receive evidence from individual citizens, from government and municipal authorities and from organizations and enterprises affected by smoke contamination of the environment.
- To determine the source of the problem as to location, duration, nature and extent.
- To review burning practices in agriculture, forestry, brush and weed control, refuse disposal and land clearing.
- To receive evidence concerning the effects of smoke on human health and on the life of the community including the safe use of transportation facilities and industry, commerce and recreational activities.
- To compile information as a basis for a report and possible recommendations to the Minister responsible for the administration of the Clean Environment Act.

Regional Hearings

Regional hearings will be held to provide an oppurtunity for representations from those with firsthand knowledge of the problem, its sources and effects at 10:00 a.m. on the following dates at the places mentioned:

- Lac Du Bonnet, December 7, 1976, Curling Club, MacArthur & 3rd St.
- Falcon Lake, December 8, 1976, El'Nor Resort, Falcon Beach.
- Steinbach, December 9, 1976, Town Council Chambers, Civic Admin. Centre, 225 Reimer Avenue.
- Brandon, December 17, 1976, City Council Chambers, Civic Admin. Building, 9th Street and Lousie Avenue.
- Additional hearings may be held in other regions if warranted by public interest.

Central Hearing

A central hearing will be held to receive briefs and testimony from individuals and organizations having a special knowledge or direct interest bearing on the smoke problems. This hearing will take place at 10:00 a.m.:

- Winnipeg, January 17-18, 1977, Building No. 2, Fort Osborne Complex, 139 Tuxedo Avenue.

Representations

Any person who has an interest in the problems under consideration may appear before the Commission at one of the hearings listed above. Any person who wishes to make a representation at one of these hearings should so advise the Commission at Box 4, Building 2, 139 Tuxedo Avenue, Winnipeg, R3N OH6 in writing or by telephoning 489-4511 Extension 192. Briefs for presentation to the central hearing on January 17-18, 1977 should be forwarded to reach the Commission by January 3, 1977 to provide time for reproduction and distribution prior to the hearing date.

MANITOBA (logo)

Appendix C

THE CLEAN ENVIRONMENT COMMISSION

INVESTIGATION OF SMOKE CONDITIONS

Pursuant to the provisions of The Clean Environment Act, The Clean Environment Commission will hold public hearings to investigate the presence of smoke in Manitoba during the past several weeks.

Purpose of Hearings

- To hear representations and receive evidence from individual citizens, from government and municipal authorities and from organizations and enterprises affected by smoke contamination of the environment.
- To determine the source of the problem as to location, duration, nature and extent.
- To review burning practices in agriculture, forestry, brush and weed control, refuse disposal and land clearing.
- To receive evidence concerning the effects of smoke on human health and on the life of the community including the safe use of transportation facilities and industry, commerce and recreational activities.
- To compile information as a basis for a report and possible recommendations to the Minister responsible for the administration of The Clean Environment Act.

Regional Hearings

Regioanl hearings will be held to provide an oppurtunity for representations from those with firsthand knowledge of the problem, its sources and effects at 10:00 a.m. on the following dates at the places mentioned:

- Carman, January 4, 1977 Council Chambers, 12 - 2nd Ave. SW
- Teulon, January 5, 1977 Teulon Centennial Centre, Main St. S.
- Dauphin, January 12, 1977 Council Chambers, 21 - 2nd Ave. NW
- Additional hearings may be held in other regions if warranted by public interest.

Central Hearing

A central hearing will be held to receive briefs and testimony from individuals and organizations having a special knowledge or direct interest bearing on the smoke problems. This hearing will take place at 10:00 a.m.:

- Winnipeg, January 17-18, 1977, Building # 2, Fort Osborne Complex, 139 Tuxedo Avenue.

Representations

Any person who has an interest in the problems under consideration may appear before the Commission at one of the hearings listed above. Any person who wishes to make a representation at one of these hearings should sc advise the Commission at Box 4, Building 2, 139 Tuxedo Avenue, Winnipeg R3N OH6 in writing or by telephoning 489-4511, Extension 192. Briefs for presentation to the central hearing on January 17-18, 1977 should be forwarded to reach the Commission by January 3, 1977 to provide time for reproduction and distribution prior to the hearing date.